



SEQUENCE LISTING

<110> Broun, Pierre

<120> METHOD FOR MODIFYING A BIOSYNTHETIC PATHWAY

<130> 514442001200/MBI0032

<140> US 09/810,836

<141> 2001-03-16

<160> 18

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 1239

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (6)...(1091)

<223> G993

<400> 1

| | | | | | | | | | | | | | | | | | |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|----|
| caaata | atg | gaa | tac | agc | tgt | gta | gac | gac | agt | agt | aca | acg | tca | gaa | tct | | 50 |
| | Met | Glu | Tyr | Ser | Cys | Val | Asp | Asp | Ser | Ser | Thr | Thr | Ser | Glu | Ser | | |
| 1 | 5 | | | | | 10 | | | | | | | | | 15 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|----|
| ctc | tcc | atc | tct | act | act | cca | aag | ccg | aca | acg | acg | gag | aag | aaa | | 98 |
| Leu | Ser | Ile | Ser | Thr | Thr | Pro | Lys | Pro | Thr | Thr | Thr | Glu | Lys | Lys | | |
| 20 | | | | 25 | | | | | | | | 30 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ctc | tct | tct | ccg | ccg | gct | acg | tgc | atg | cgt | ctc | tac | aga | atg | gga | agc | 146 |
| Leu | Ser | Ser | Pro | Pro | Ala | Thr | Ser | Met | Arg | Leu | Tyr | Arg | Met | Gly | Ser | |
| 35 | | | 40 | | | | | | | | | 45 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ggc | gga | agc | agc | gtc | gtt | tgc | aat | tca | gag | aac | ggc | gtc | gag | acc | gag | 194 |
| Gly | Gly | Ser | Ser | Val | Val | Leu | Asp | Ser | Glu | Asn | Gly | Val | Glu | Thr | Glu | |
| 50 | | | | 55 | | | | | | | 60 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tca | cgt | aag | ctt | cct | tgc | tgc | aaa | tat | aaa | ggc | gtt | gtg | cct | cag | cct | 242 |
| Ser | Arg | Lys | Leu | Pro | Ser | Ser | Lys | Tyr | Lys | Gly | Val | Val | Pro | Gln | Pro | |
| 65 | | | 70 | | | | | | | | | 75 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aac | gga | aga | tgg | gga | gct | cag | att | tac | gag | aag | cat | cag | cga | gtt | tgg | 290 |
| Asn | Gly | Arg | Trp | Gly | Ala | Gln | Ile | Tyr | Glu | Lys | His | Gln | Arg | Val | Trp | |
| 80 | | | | 85 | | | | | | | | 90 | | 95 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ctc | ggt | act | ttc | aac | gag | gaa | gaa | gct | gct | tct | tct | tac | gac | atc | | 338 |
| Leu | Gly | Thr | Phe | Asn | Glu | Glu | Glu | Glu | Ala | Ala | Ser | Ser | Tyr | Asp | Ile | |
| 100 | | | | | 105 | | | | | | | | 110 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gcc | gtg | agg | aga | ttc | cgc | ggc | cgc | gac | gcc | gtc | act | aac | ttc | aaa | tct | 386 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

| | | | |
|---|-----|-----|------|
| Ala Val Arg Arg Phe Arg Gly Arg Asp Ala Val Thr Asn Phe Lys Ser | | | |
| 115 | 120 | 125 | |
| caa gtt gat gga aac gac gcc gaa tcg gct ttt ctt gac gct cat tct | | | 434 |
| Gln Val Asp Gly Asn Asp Ala Glu Ser Ala Phe Leu Asp Ala His Ser | | | |
| 130 | 135 | 140 | |
| aaa gct gag atc gtg gat atg ttg agg aaa cac act tac gcc gat gag | | | 482 |
| Lys Ala Glu Ile Val Asp Met Leu Arg Lys His Thr Tyr Ala Asp Glu | | | |
| 145 | 150 | 155 | |
| ttt gag cag agt aga cgg aag ttt gtt aac ggc gac gga aaa cgc tct | | | 530 |
| Phe Glu Gln Ser Arg Arg Lys Phe Val Asn Gly Asp Gly Lys Arg Ser | | | |
| 160 | 165 | 170 | 175 |
| ggg ttg gag acg gcg acg tac gga aac gac gct gtt ttg aga gcg cgt | | | 578 |
| Gly Leu Glu Thr Ala Thr Tyr Gly Asn Asp Ala Val Leu Arg Ala Arg | | | |
| 180 | 185 | 190 | |
| gag gtt ttg ttc gag aag act gtt acg ccg agc gac gtc ggg aag ctg | | | 626 |
| Glu Val Leu Phe Glu Lys Thr Val Thr Pro Ser Asp Val Gly Lys Leu | | | |
| 195 | 200 | 205 | |
| aac cgt tta gtg ata ccg aaa caa cac gcg gag aag cat ttt ccg tta | | | 674 |
| Asn Arg Leu Val Ile Pro Lys Gln His Ala Glu Lys His Phe Pro Leu | | | |
| 210 | 215 | 220 | |
| ccg gcg atg acg acg gtc atg ggg aat ccg tct ccg acg aaa ggc | | | 722 |
| Pro Ala Met Thr Thr Ala Met Gly Met Asn Pro Ser Pro Thr Lys Gly | | | |
| 225 | 230 | 235 | |
| gtt ttg att aac ttg gaa gat aga aca ggg aaa gtg tgg ccg ttc cgt | | | 770 |
| Val Leu Ile Asn Leu Glu Asp Arg Thr Gly Lys Val Trp Arg Phe Arg | | | |
| 240 | 245 | 250 | 255 |
| tac agt tac tgg aac agc agt caa agt tac gtg ttg acc aag ggc tgg | | | 818 |
| Tyr Ser Tyr Trp Asn Ser Ser Gln Ser Tyr Val Leu Thr Lys Gly Trp | | | |
| 260 | 265 | 270 | |
| agc cgg ttc gtt aaa gag aag aat ctt cga gcc ggt gat gtg gtt tgt | | | 866 |
| Ser Arg Phe Val Lys Glu Lys Asn Leu Arg Ala Gly Asp Val Val Cys | | | |
| 275 | 280 | 285 | |
| ttc gag aga tca acc gga cca gac cgg caa ttg tat atc cac tgg aaa | | | 914 |
| Phe Glu Arg Ser Thr Gly Pro Asp Arg Gln Leu Tyr Ile His Trp Lys | | | |
| 290 | 295 | 300 | |
| gtc cgg tct agt ccg gtt cag act gtg gtt agg cta ttc gga gtc aac | | | 962 |
| Val Arg Ser Ser Pro Val Gln Thr Val Val Arg Leu Phe Gly Val Asn | | | |
| 305 | 310 | 315 | |
| att ttc aat gtg agt aac gag aaa cca aac gac gtc gca gta gag tgt | | | 1010 |
| Ile Phe Asn Val Ser Asn Glu Lys Pro Asn Asp Val Ala Val Glu Cys | | | |
| 320 | 325 | 330 | 335 |
| gtt ggc aag aag aga tct cgg gaa gat gat ttg ttt tcg tta ggg tgt | | | 1058 |
| Val Gly Lys Lys Arg Ser Arg Glu Asp Asp Leu Phe Ser Leu Gly Cys | | | |

340

345

350

tcc aag aag cag gcg att atc aac atc ttg tga caaattcttt ttttttggtt 1111
 Ser Lys Lys Gln Ala Ile Ile Asn Ile Leu *
 355 360

tttttcttca atttgttct ccttttcaa tattttgtat tgaaatgaca agttgtaaat 1171
 taggacaaga caagaaaaaa tgacaactag acaaatagt ttttgttaa aaaaaaaaaa 1231
 aaaaaaaaaa 1239

<210> 2
 <211> 361
 <212> PRT
 <213> Arabidopsis thaliana

<400> 2
 Met Glu Tyr Ser Cys Val Asp Asp Ser Ser Thr Thr Ser Glu Ser Leu
 1 5 10 15
 Ser Ile Ser Thr Thr Pro Lys Pro Thr Thr Thr Glu Lys Lys Leu
 20 25 30
 Ser Ser Pro Pro Ala Thr Ser Met Arg Leu Tyr Arg Met Gly Ser Gly
 35 40 45
 Gly Ser Ser Val Val Leu Asp Ser Glu Asn Gly Val Glu Thr Glu Ser
 50 55 60
 Arg Lys Leu Pro Ser Ser Lys Tyr Lys Gly Val Val Pro Gln Pro Asn
 65 70 75 80
 Gly Arg Trp Gly Ala Gln Ile Tyr Glu Lys His Gln Arg Val Trp Leu
 85 90 95
 Gly Thr Phe Asn Glu Glu Glu Ala Ala Ser Ser Tyr Asp Ile Ala
 100 105 110
 Val Arg Arg Phe Arg Gly Arg Asp Ala Val Thr Asn Phe Lys Ser Gln
 115 120 125
 Val Asp Gly Asn Asp Ala Glu Ser Ala Phe Leu Asp Ala His Ser Lys
 130 135 140
 Ala Glu Ile Val Asp Met Leu Arg Lys His Thr Tyr Ala Asp Glu Phe
 145 150 155 160
 Glu Gln Ser Arg Arg Lys Phe Val Asn Gly Asp Gly Lys Arg Ser Gly
 165 170 175
 Leu Glu Thr Ala Thr Tyr Gly Asn Asp Ala Val Leu Arg Ala Arg Glu
 180 185 190
 Val Leu Phe Glu Lys Thr Val Thr Pro Ser Asp Val Gly Lys Leu Asn
 195 200 205
 Arg Leu Val Ile Pro Lys Gln His Ala Glu Lys His Phe Pro Leu Pro
 210 215 220
 Ala Met Thr Thr Ala Met Gly Met Asn Pro Ser Pro Thr Lys Gly Val
 225 230 235 240
 Leu Ile Asn Leu Glu Asp Arg Thr Gly Lys Val Trp Arg Phe Arg Tyr
 245 250 255
 Ser Tyr Trp Asn Ser Ser Gln Ser Tyr Val Leu Thr Lys Gly Trp Ser
 260 265 270
 Arg Phe Val Lys Glu Lys Asn Leu Arg Ala Gly Asp Val Val Cys Phe
 275 280 285
 Glu Arg Ser Thr Gly Pro Asp Arg Gln Leu Tyr Ile His Trp Lys Val
 290 295 300
 Arg Ser Ser Pro Val Gln Thr Val Val Arg Leu Phe Gly Val Asn Ile
 305 310 315 320
 Phe Asn Val Ser Asn Glu Lys Pro Asn Asp Val Ala Val Glu Cys Val

| | | |
|--|-----------------------------|-----|
| 325 | 330 | 335 |
| Gly Lys Lys Arg Ser Arg Glu Asp Asp | Leu Phe Ser Leu Gly Cys Ser | |
| 340 | 345 | 350 |
| Lys Lys Gln Ala Ile Ile Asn Ile Leu | | |
| 355 | 360 | |
| | | |
| <210> 3 | | |
| <211> 1226 | | |
| <212> DNA | | |
| <213> Arabidopsis thaliana | | |
| | | |
| <220> | | |
| <221> CDS | | |
| <222> (111)...(989) | | |
| <223> G1845 | | |
| | | |
| <400> 3 | | |
| aagacataat tttctctgtt ttccttagctc ttcctctca aattcttcca ttgctcttg | | 60 |
| tttggcaaa tcgtgaactg ccacgtctt aaggcatcag tgaagcaaag atg gac | | 116 |
| | Met Asp | |
| | 1 | |
| | | |
| ttt gac gag gag cta aat ctt tgt att acg aaa ggt aaa aat gtt gat | | 164 |
| Phe Asp Glu Glu Leu Asn Leu Cys Ile Thr Lys Gly Lys Asn Val Asp | | |
| 5 | 10 | 15 |
| | | |
| cat tct ttt gga gga gaa gct tct tcc acg tcc cca aga tct atg aag | | 212 |
| His Ser Phe Gly Gly Glu Ala Ser Ser Thr Ser Pro Arg Ser Met Lys | | |
| 20 | 25 | 30 |
| | | |
| aaa atg aag agt cct agt cgt cct aaa ccc tat ttc caa tcc tct tct | | 260 |
| Lys Met Lys Ser Pro Ser Arg Pro Lys Pro Tyr Phe Gln Ser Ser Ser | | |
| 35 | 40 | 45 |
| 50 | | |
| | | |
| tct cct tat tcg tta gag gct ttc cct ttt tct ctc gat cca aca ctt | | 308 |
| Ser Pro Tyr Ser Leu Glu Ala Phe Pro Phe Ser Leu Asp Pro Thr Leu | | |
| 55 | 60 | 65 |
| | | |
| cag aat cag caa caa ctc gga tca tac gtt ccg gta ctt gag caa | | 356 |
| Gln Asn Gln Gln Gln Leu Gly Ser Tyr Val Pro Val Leu Glu Gln | | |
| 70 | 75 | 80 |
| | | |
| cga caa gac ccg aca atg caa ggc cag aag caa atg atc tcc ttt agt | | 404 |
| Arg Gln Asp Pro Thr Met Gln Gly Gln Lys Gln Met Ile Ser Phe Ser | | |
| 85 | 90 | 95 |
| | | |
| cct caa caa caa cag cag cag cag tat atg gcc cag tac tgg agt | | 452 |
| Pro Gln Gln Gln Gln Gln Gln Tyr Met Ala Gln Tyr Trp Ser | | |
| 100 | 105 | 110 |
| | | |
| gac aca ttg aat ctg agt cca aga gga aga atg atg atg atg agc | | 500 |
| Asp Thr Leu Asn Leu Ser Pro Arg Gly Arg Met Met Met Met Ser | | |
| 115 | 120 | 125 |
| 130 | | |
| | | |
| caa gaa gct gtt caa cct tac atc gca acg aag ctg tac aga gga gtg | | 548 |
| Gln Glu Ala Val Gln Pro Tyr Ile Ala Thr Lys Leu Tyr Arg Gly Val | | |
| 135 | 140 | 145 |

| | | |
|---|-----|-----|
| 35 | 40 | 45 |
| Ser Ser Ser Pro Tyr Ser Leu Glu Ala Phe Pro Phe Ser Leu Asp Pro | | |
| 50 | 55 | 60 |
| Thr Leu Gln Asn Gln Gln Gln Gln Leu Gly Ser Tyr Val Pro Val Leu | | |
| 65 | 70 | 75 |
| Glu Gln Arg Gln Asp Pro Thr Met Gln Gly Gln Lys Gln Met Ile Ser | | |
| 85 | 90 | 95 |
| Phe Ser Pro Gln Gln Gln Gln Gln Gln Tyr Met Ala Gln Tyr | | |
| 100 | 105 | 110 |
| Trp Ser Asp Thr Leu Asn Leu Ser Pro Arg Gly Arg Met Met Met Met | | |
| 115 | 120 | 125 |
| Met Ser Gln Glu Ala Val Gln Pro Tyr Ile Ala Thr Lys Leu Tyr Arg | | |
| 130 | 135 | 140 |
| Gly Val Arg Gln Arg Gln Trp Gly Lys Trp Val Ala Glu Ile Arg Lys | | |
| 145 | 150 | 155 |
| 160 | | |
| Pro Arg Ser Arg Ala Arg Leu Trp Leu Gly Thr Phe Asp Thr Ala Glu | | |
| 165 | 170 | 175 |
| Glu Ala Ala Met Ala Tyr Asp Arg Gln Ala Phe Lys Leu Arg Gly His | | |
| 180 | 185 | 190 |
| Ser Ala Thr Leu Asn Phe Pro Glu His Phe Val Asn Lys Glu Ser Glu | | |
| 195 | 200 | 205 |
| Leu His Asp Ser Asn Ser Ser Asp Gln Lys Glu Pro Glu Thr Pro Gln | | |
| 210 | 215 | 220 |
| Pro Ser Glu Val Asn Leu Glu Ser Lys Glu Leu Pro Val Ile Asp Val | | |
| 225 | 230 | 235 |
| 240 | | |
| Gly Arg Glu Glu Gly Met Ala Glu Ala Trp Tyr Asn Ala Ile Thr Ser | | |
| 245 | 250 | 255 |
| Gly Trp Gly Pro Glu Ser Pro Leu Trp Asp Asp Leu Asp Ser Ser His | | |
| 260 | 265 | 270 |
| Gln Phe Ser Ser Glu Ser Ser Ser Ser Pro Leu Ser Cys Pro Met | | |
| 275 | 280 | 285 |
| Arg Pro Phe Phe | | |
| 290 | | |

<210> 5
<211> 845
<212> DNA
<213> Arabidopsis thaliana

<220>
<221> CDS
<222> (89) ... (673)
<223> G1386

| | | |
|---|-----|--|
| <400> 5 | | |
| aattttatcc ctttcttc aatcttccca caaaaattta actctttcg tcacactaaag | 60 | |
| tcccttttaa aagaaaatat cccatta atg gaa cgt gac gac tgc cgg aga | 112 | |
| Met Glu Arg Asp Asp Cys Arg Arg | | |
| 1 | 5 | |

| | | |
|---|-----|----|
| ttt cag gac tcg ccg gcg cag acg acg gag aga aga gtg aaa tat aaa | 160 | |
| Phe Gln Asp Ser Pro Ala Gln Thr Thr Glu Arg Arg Val Lys Tyr Lys | | |
| 10 | 15 | 20 |

| | | | |
|---|-----|----|----|
| cca aag aag aaa aga gcc aaa gat gat gat gag aaa gtt gtt tcg | 208 | | |
| Pro Lys Lys Lys Arg Ala Lys Asp Asp Asp Glu Lys Val Val Ser | | | |
| 25 | 30 | 35 | 40 |

| | | | |
|---|-----|-----|-----|
| aag cat cca aat ttt cga ggt gtc aga atg aga caa tgg gga aaa tgg | | 256 | |
| Lys His Pro Asn Phe Arg Gly Val Arg Met Arg Gln Trp Gly Lys Trp | | | |
| 45 | 50 | 55 | |
| gtg tcc gaa atc aga gag cca aaa aag aaa tca aga atc tgg ctc ggt | | 304 | |
| Val Ser Glu Ile Arg Glu Pro Lys Lys Ser Arg Ile Trp Leu Gly | | | |
| 60 | 65 | 70 | |
| act ttc tcc acg gcg gag atg gcg cgt gct cac gac gtg gca gct | | 352 | |
| Thr Phe Ser Thr Ala Glu Met Ala Ala Arg Ala His Asp Val Ala Ala | | | |
| 75 | 80 | 85 | |
| tta gcc atc aaa ggc ggt tct gca cat ctc aac ttc ccg gag ctc gct | | 400 | |
| Leu Ala Ile Lys Gly Gly Ser Ala His Leu Asn Phe Pro Glu Leu Ala | | | |
| 90 | 95 | 100 | |
| tat cac ctc cct aga cca gct agt gcc gac cct aaa gac atc caa gct | | 448 | |
| Tyr His Leu Pro Arg Pro Ala Ser Ala Asp Pro Lys Asp Ile Gln Ala | | | |
| 105 | 110 | 115 | 120 |
| gcc gcc gca gct gca gcc gct gtg gcc att gac atg gat gta gag | | 496 | |
| Ala Ala Ala Ala Ala Ala Val Ala Ile Asp Met Asp Val Glu | | | |
| 125 | 130 | 135 | |
| acg tct tcg ccg tcg cca tct ccc aca gtt acg gaa acg tca tct ccg | | 544 | |
| Thr Ser Ser Pro Ser Pro Thr Val Thr Glu Thr Ser Ser Pro | | | |
| 140 | 145 | 150 | |
| gct atg ata gca ctc tcc gac gac gcg ttc tcc gat ctt cct gat ctc | | 592 | |
| Ala Met Ile Ala Leu Ser Asp Asp Ala Phe Ser Asp Leu Pro Asp Leu | | | |
| 155 | 160 | 165 | |
| ttg ctc aac gtg aac cat aac atc gat ggc ttc tgg gac tct ttt ccc | | 640 | |
| Leu Leu Asn Val Asn His Asn Ile Asp Gly Phe Trp Asp Ser Phe Pro | | | |
| 170 | 175 | 180 | |
| tat gaa gaa ccc ttc ctc tct caa agt tac tag aaactcaaaa ctatgtcggt | | 693 | |
| Tyr Glu Glu Pro Phe Leu Ser Gln Ser Tyr * | | | |
| 185 | 190 | | |
| tttgtatgta ttttgtcat gtgaccattt ttgacgtcg aaaatcaccc ggataatcca | | 753 | |
| aattgtatga tttattaatg gttgatgatt ttcttgtgt ggaacaatgt gtatgatacg | | 813 | |
| taatcaaaaag ttcaaaaaaa aaataaaaaaa aa | | 845 | |
| <210> 6 | | | |
| <211> 194 | | | |
| <212> PRT | | | |
| <213> Arabidopsis thaliana | | | |
| <400> 6 | | | |
| Met Glu Arg Asp Asp Cys Arg Arg Phe Gln Asp Ser Pro Ala Gln Thr | | | |
| 1 5 10 15 | | | |
| Thr Glu Arg Arg Val Lys Tyr Lys Pro Lys Lys Lys Arg Ala Lys Asp | | | |
| 20 25 30 | | | |
| Asp Asp Asp Glu Lys Val Val Ser Lys His Pro Asn Phe Arg Gly Val | | | |
| 35 40 45 | | | |

Arg Met Arg Gln Trp Gly Lys Trp Val Ser Glu Ile Arg Glu Pro Lys
 50 55 60
 Lys Lys Ser Arg Ile Trp Leu Gly Thr Phe Ser Thr Ala Glu Met Ala
 65 70 75 80
 Ala Arg Ala His Asp Val Ala Ala Leu Ala Ile Lys Gly Gly Ser Ala
 85 90 95
 His Leu Asn Phe Pro Glu Leu Ala Tyr His Leu Pro Arg Pro Ala Ser
 100 105 110
 Ala Asp Pro Lys Asp Ile Gln Ala Ala Ala Ala Ala Ala Ala Ala
 115 120 125
 Val Ala Ile Asp Met Asp Val Glu Thr Ser Ser Pro Ser Pro Ser Pro
 130 135 140
 Thr Val Thr Glu Thr Ser Ser Pro Ala Met Ile Ala Leu Ser Asp Asp
 145 150 155 160
 Ala Phe Ser Asp Leu Pro Asp Leu Leu Leu Asn Val Asn His Asn Ile
 165 170 175
 Asp Gly Phe Trp Asp Ser Phe Pro Tyr Glu Glu Pro Phe Leu Ser Gln
 180 185 190
 Ser Tyr

<210> 7
 <211> 891
 <212> DNA
 <213> Arabidopsis thaliana

<220>
 <221> CDS
 <222> (59) ... (646)
 <223> G872

| | | |
|---|-----|--|
| <400> 7 | | |
| ccggaaacag aatccaattc aaccaaaccg aatcgaaaccg aaccggagtt tttatccca | 58 | |
| atg gtg aag caa gcg atg aag gaa gag gag aag aag aga aac acg gcg | 106 | |
| Met Val Lys Gln Ala Met Lys Glu Glu Lys Lys Arg Asn Thr Ala | | |
| 1 5 10 15 | | |
| atg cag tca aag tac aaa gga gtg agg aag agg aaa tgg gga aaa tgg | 154 | |
| Met Gln Ser Lys Tyr Lys Gly Val Arg Lys Arg Lys Trp Gly Lys Trp | | |
| 20 25 30 | | |
| gta tcg gag atc aga ctt cca cac agc aga gaa cga att tgg tta ggc | 202 | |
| Val Ser Glu Ile Arg Leu Pro His Ser Arg Glu Arg Ile Trp Leu Gly | | |
| 35 40 45 | | |
| tct tac gac act ccc gag aag gcg gcg cgt gct ttc gac gcc gct caa | 250 | |
| Ser Tyr Asp Thr Pro Glu Lys Ala Ala Arg Ala Phe Asp Ala Ala Gln | | |
| 50 55 60 | | |
| ttt tgt ctc cgc ggc gat gct aat ttc aat ttc cct aat aat cca | 298 | |
| Phe Cys Leu Arg Gly Gly Asp Ala Asn Phe Asn Phe Pro Asn Asn Pro | | |
| 65 70 75 80 | | |
| ccg tcg atc tcc gta gaa aag tcg ttg acg cct ccg gag att cag gaa | 346 | |
| Pro Ser Ile Ser Val Glu Lys Ser Leu Thr Pro Pro Glu Ile Gln Glu | | |
| 85 90 95 | | |

Phe Leu Asp Leu Leu Pro Met Asn Phe Gly Phe Asp Ser Phe Ser Asp
145 150 155 160
Asp Phe Ser Gly Phe Ser Gly Gly Asp Arg Phe Thr Glu Ile Leu Pro
165 170 175
Ile Glu Asp Tyr Gly Gly Glu Ser Leu Leu Asp Glu Ser Leu Ile Leu
180 185 190
Trp Asp Phe
195

<210> 9
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 9
gacccaaagct tgtttgggtt gactaagggtt gggggtag 39

<210> 10
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 10
acgcggatcc gtagagaggc agtgaaaacta ctgaaattac g 41

<210> 11
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 11
gcccaagctt gggttgctatg gtagggacta t 31

<210> 12
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 12
tttgatccat ggtccaaaga ttttttctt tcca 34

<210> 13
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 13
agcgcctatgg ccggaaaccgt cgagcatggg ccgtccctgtat g 41

<210> 14
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 14
cgcggatcccg ccaggagagt tgttgattca ttgtttgc 38

<210> 15
<211> 40
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 15
cgctcttagac cggaaccgtc gagcatggtc cgtccctgtat 40

<210> 16
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 16
cgcggatcccg ccaggagagt tgttgattca ttgtttgc 38

<210> 17
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 17
acccaagctt gggatatatg acttaaatat atgtacaagt agc 43

<210> 18
<211> 39
<212> DNA
<213> Artificial Sequence

<220>

<223> PCR primer

<400> 18

cgccggatcca ttaatcttc cttccgctct ctttctatg

39